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Effects of Bacillus Serine Proteases on the Bacterial Biofilms

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Abstract

© 2017 Olga Mitrofanova et al. Serratia marcescens is an emerging opportunistic pathogen responsible for many hospital-acquired infections including catheter-associated bacteremia and urinary tract and respiratory tract infections. Biofilm formation is one of the mechanisms employed by S. marcescens to increase its virulence and pathogenicity. Here, we have investigated the main steps of the biofilm formation by S. marcescens SR 41-8000. It was found that the biofilm growth is stimulated by the nutrient-rich environment. The time-course experiments showed that S. marcescens cells adhere to the surface of the catheter and start to produce extracellular polymeric substances (EPS) within the first 2 days of growth. After 7 days, S. marcescens biofilms maturate and consist of bacterial cells embedded in a self-produced matrix of hydrated EPS. In this study, the effect of Bacillus pumilus 3-19 proteolytic enzymes on the structure of 7-day-old S. marcescens biofilms was examined. Using quantitative methods and scanning electron microscopy for the detection of biofilm, we demonstrated a high efficacy of subtilisin-like protease and glutamyl endopeptidase in biofilm removal. Enzymatic treatment resulted in the degradation of the EPS components and significant eradication of the biofilms.

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